

UTAH PHYSICIANS
FOR A HEALTHY ENVIRONMENT

Air Quality Board Presentation

2 May 2007

Brian Moench, M.D.

*Board Certification:
American Society of Anesthesiologists*

*Fellowship: Intensive Care Medicine,
Massachusetts General Hospital*

*Former Instructor in Anesthesia,
Harvard Medical School*

*Past Chairman of the Anesthesia Department,
Holy Cross Hospital, Salt Lake City, UT*

Bold Action Needed on Bad Air

*Current air pollution levels along
the Wasatch Front constitute
a public health crisis.*

*Without aggressive preventive measures,
in the next twenty years, air pollution
will become a public health catastrophe.*

Brian Moench, M.D.

Air pollution will become worse

- 1. Plans for more coal power plants.*
- 2. Vehicle traffic to double.*
- 3. Climate change will aggravate.
both winter and summer pollution.*

Bold Action Needed on Bad Air

*Current air pollution levels along
the Wasatch Front constitute
a public health crisis.*

*Without aggressive preventive measures,
in the next twenty years, air pollution
will become a public health catastrophe.*

Environmental Radiation Release From Coal – Fired Power Plants

- Coal power plants are the major source of radiation released into the environment.
- Each year, a typical 1000 Megawatt coal – fired power plant burns 4 million tons of coal, containing about 18 tons of radioactive material, primarily uranium and thorium.
- Uranium levels are significantly higher in Utah coal compared to eastern coal.

*Gabbard A. Coal Combustion: Nuclear Resource or Danger.
Oak Ridge National Laboratory Review, 01 Jan 1993, Vol. 26, (3, 4)*

Environmental Radiation Release From Coal – Fired Power Plants

- The processing and combustion of coal releases not only uranium and thorium, but also decay products like radium, radon, polonium, and plutonium, which are even more radioactive.
- *The radiation 'effective dose equivalent' from coal plants is 100 times that of nuclear power plants.*
- Every year, the total release of radiation from U.S. coal – fired power plants is 155 times what was released at the *Three Mile Island* incident.

*Gabbard A. Coal Combustion: Nuclear Resource or Danger.
Oak Ridge National Laboratory Review, 01 Jan 1993, Vol. 26, (3, 4)*

AND :

Brian Moench, M.D

Environmental Radiation Release From Coal – Fired Power Plants

- The 'nuclear fuel' (currently considered as a contaminant in coal), has more energy content than the coal itself.
- *Therefore, the combustion of coal actually wastes more energy than it produces.*
- At the same time, coal combustion releases significant amounts of radioactive material into the environment.

*Gabbard A. Coal Combustion: Nuclear Resource or Danger.
Oak Ridge National Laboratory Review, 01 Jan 1993, Vol. 26, (3, 4)*

Environmental Radiation Release From Coal – Fired Power Plants

About 1 % of the radioactive material escapes into the environment, *but these radiation sources also concentrate in post – combustion residue, as slag, cinders and ash.*

The half – lives of most of these contaminants are virtually infinite. The radioactive risk may appear small at first, but it becomes magnified *the longer they are released into the environment from coal - fired power plants.*

*Gabbard A. Coal Combustion: Nuclear Resource or Danger.
Oak Ridge National Laboratory Review, 01 Jan 1993, Vol. 26, (3, 4)*

Environmental Radiation Release From Coal – Fired Power Plants

Coal – fired power plants are now in their 7th decade, and the IPP project is in its 4th decade.

Citing the long – term and widespread use of coal - fired power plants, the EPA website states:

*“significant quantities of nuclear materials
are being treated as coal waste,
which might become the clean – up
nightmare of the future.”*

*Gabbard A. Coal Combustion: Nuclear Resource or Danger.
Oak Ridge National Laboratory Review, 01 Jan 1993, Vol. 26, (3, 4)*

AND

Environmental Radiation Release From Coal – Fired Power Plants

The greatest potential *radioactive* danger from accumulated coal ash stems from a problem which is currently completely ignored.

Uranium 238 in coal waste, (when bombarded slowly over time by neutrons resulting from cosmic rays striking oxygen and nitrogen), is converted to Plutonium - 239.

*Gabbard A. Coal Combustion: Nuclear Resource or Danger.
Oak Ridge National Laboratory Review, 01 Jan 1993, Vol. 26, (3, 4)*

Brian Moench, M.D

Environmental Radiation Release From Coal – Fired Power Plants

Coal combustion waste *is not treated as nuclear waste*, and is sometimes used in the manufacture of other materials, with which humans have close contact.

Plutonium - 239 is created in these materials and is regarded as the most toxic substance on earth.

It has a radio - toxicity of 3.4×10^{11} times greater than Uranium - 238.

*Gabbard A. Coal Combustion: Nuclear Resource or Danger.
Oak Ridge National Laboratory Review, 01 Jan 1993, Vol. 26, (3, 4)*

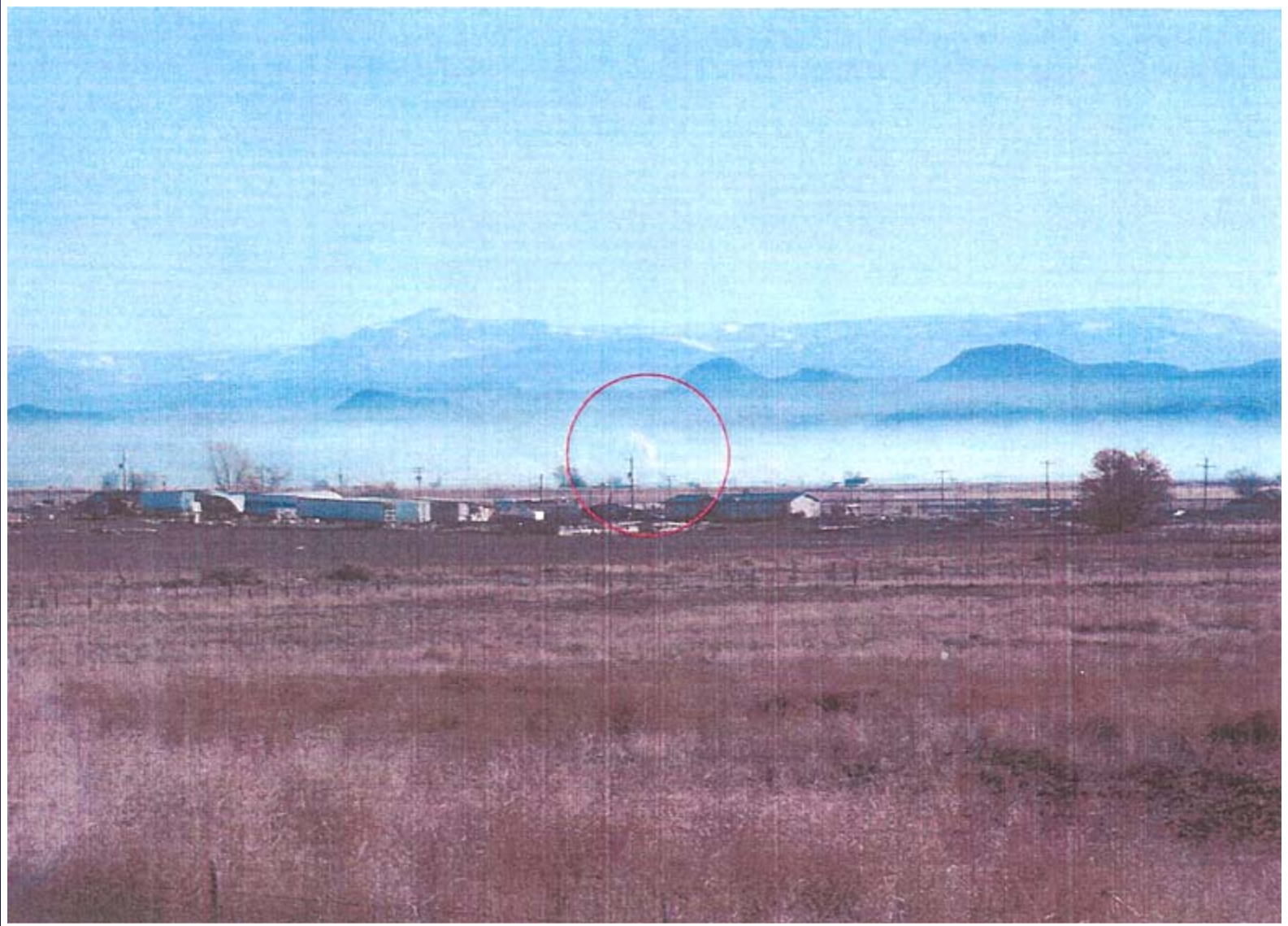
Brian Moench, M.D



Intermountain Power Plant : post – combustion material.



Intermountain Power Plant : post – combustion material.



Sevier Valley Inversion, 15 March 2004.
(The red circle indicates the site of a gypsum plant.)

Recommendations

- 1. Moratorium on new coal plants.*
- 2. State of the art controls on existing plants.*
- 3. Reduce speed limit to 55 mph when air pollution exceeds EPA limits.*
- 4. Public subsidy for mass transit, free rider ship, expanded service.*

Recommendations

- 5. Air Quality Board to pursue a 20 % emissions reduction strategy.*
- 6. State funding for more extensive environmental monitoring.*
- 7. Strategies to increase public awareness.*
- 8. Encourage school districts to use school buses that run on alternative fuels.*

Recommendations

- 9. School bus fleets should not idle in school yards while waiting for students -- the engine should be shut off, to decrease children's exposure to diesel fuel exhaust.*
- 10. Air pollution warning indices should be expanded to include pregnant women.*

Air pollution facts

- *4–8 % of all deaths directly from air pollution.*
 - *550 – 1080 deaths in Utah each year.*
 - *Shortens everyone's life span.*
-

- *Effects all organ systems.*
- *Equal to 25 % of the adverse effect of 1 pack -a- day smoking, especially for children.*
- *Children are affected the most.*

Bold Action Needed on Bad Air

The cost of the health consequences of air pollution is well over 4 – 6 billion dollars annually, to the taxpayers and citizens of Utah.

The cost of cleaning up the air is less than 1 / 10th of that amount, (most of it, a 'one – time' cost).

Air Pollution - Effects on Human Health

Richard E. Kanner, MD

*Professor of Internal Medicine
Division of Respiratory Medicine
University of Utah School of Medicine*

Presented by :

Gerald H. Ross, MD, FAAEM, FRSM

Charles Langelier, MD, PhD Student, Univ. of Utah

*Gerald H. Ross, MD, CCFP,
DABEM, DIBEM, FAAEM, FRSM*

*Board Certifications : Family Med. (Canada);
Environ. Med. (USA).*

*Former President, American Academy of Environmental Medicine.
Board of Governors, American Board of Environmental Medicine.
Fellow, Amer. Academy of Environmental Medicine.
Fellow, Royal Society of Medicine, London, UK.*

Publications: 28; Co – authored a medical textbook chapter.

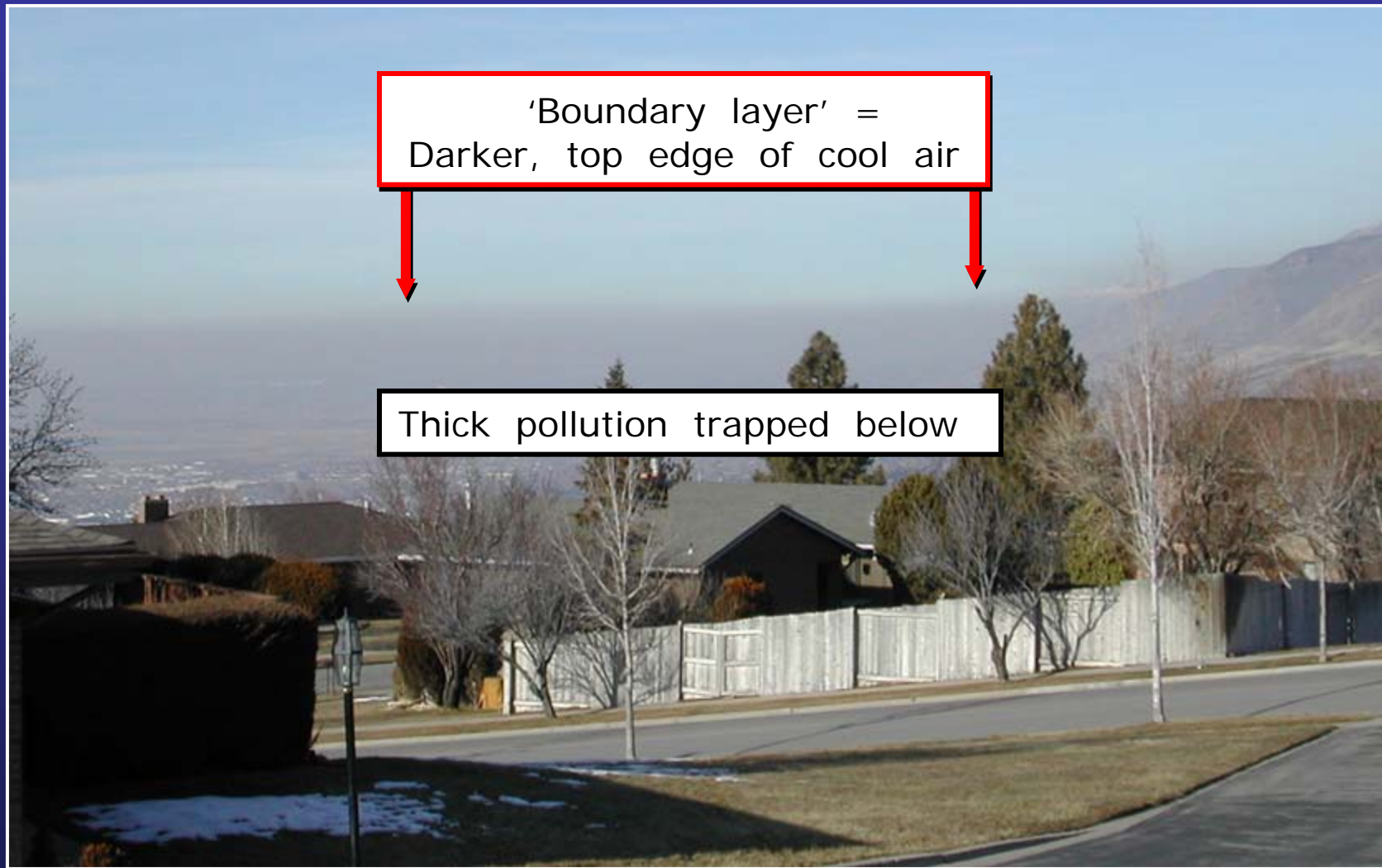
Invited speaker to :

*ATSDR, APHA, Amer. Chem. Soc., Health and Welfare Canada,
Assoc. Worker's Comp. Boards (Can.), many professional bodies.*



Bountiful 'bench', Utah -- looking north, on a clear day

Gerald H. Ross, MD



*On the Bountiful 'bench', looking north,
(Salt Lake Valley inversion -- 18 Jan 2003)*

Gerald H. Ross, MD




*The Salt Lake Valley
(same photo angle)*

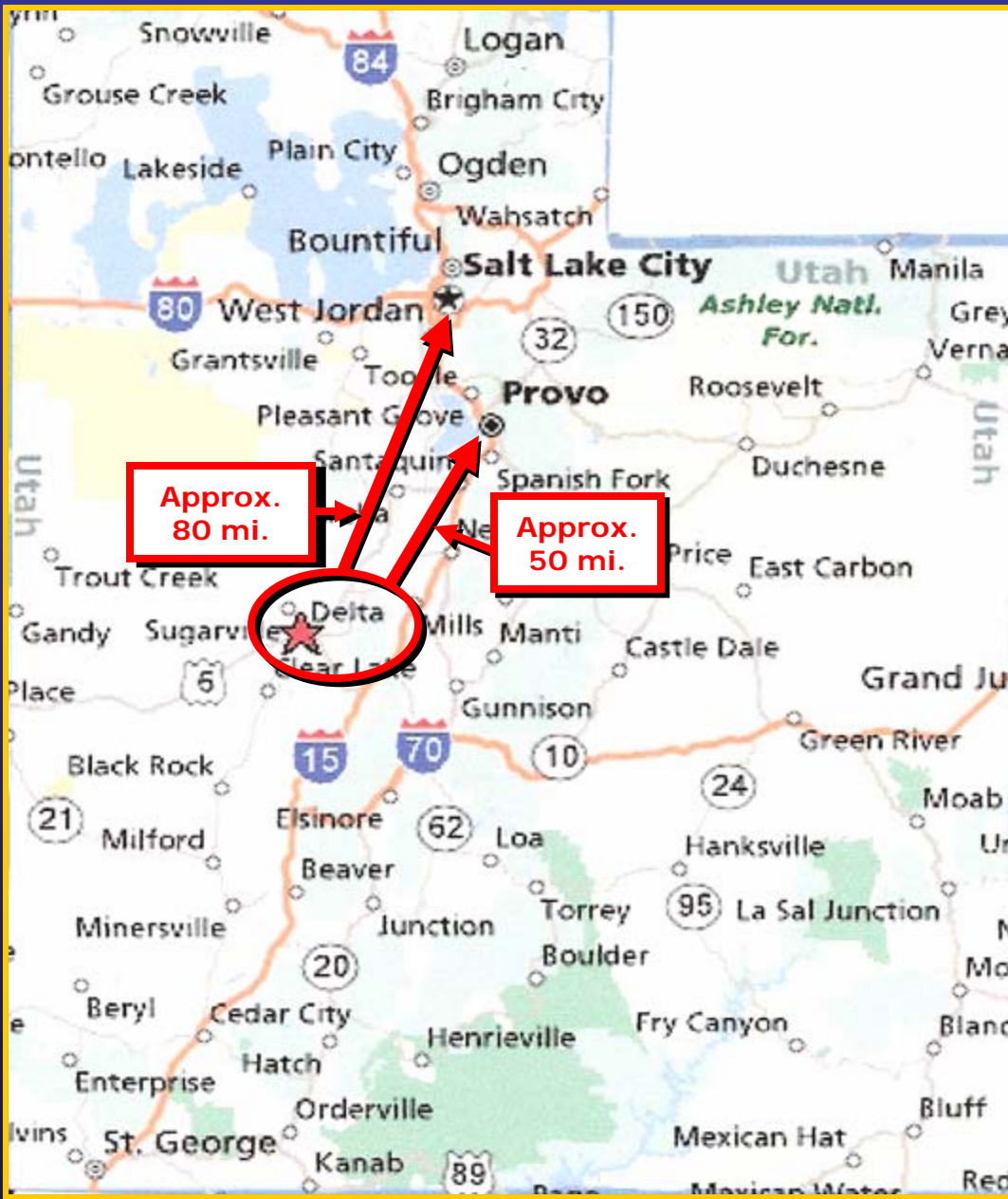
Right side: clear day

Left side : polluted day

Source:

 **AMERICAN LUNG ASSOCIATION®**
State of the Air: 2006

Gerald H. Ross, MD



A proposed coal - fired power plant in Delta, UT, is expected to release 7 to 8 million tons of CO₂ per year.

(Along with mercury and many forms of nitrogen and sulfur pollutants):

NO_x and SO_x

Air Pollution - The Two Major Concerns

1) *Particulates (man – made and natural)*

Minute particles suspended in air, now associated with serious health problems. Diesel, auto exhaust, combustion smoke from chimney stacks are important man – made sources.

Such particles may carry metals (like mercury and lead), and gasses (like sulfur and nitrogen oxides), which adhere to the particle surfaces.

Air Pollution - The Two Major Concerns

2) Ozone

*A very reactive and damaging form of oxygen :
(O_3 rather than O_2)*

*Ozone protects us while in the ozone layer
(in the upper atmosphere), but is hazardous
to breathe in high concentrations
or for long periods, at ground level.*

Particulate size in air pollution

These suspended particles are designated as:

'PM - 10' and 'PM - 2.5'

*'PM - 10' = particles smaller than 10 microns
= < 10 millionths of a meter (10 micrometers)*

*'PM - 2.5' = particles smaller than 2.5 microns
= < 2.5 millionths of a meter (2.5 micrometers)*

Comparison:

(A human hair is about 60 microns wide.)

Particulates in Air Pollution

Among the particulate matter increasingly shown as very dangerous to human health is a newer category called :

' ULTRAFINES '

- = smaller than 0.1 microns (0.1 micrometers).*
- = 100 times smaller than a PM - 10 particle.*
- = 25 times smaller than a PM - 2.5 particle.*
- = smaller than a bacteria and some viruses.*

Charles Langelier

MD / PhD Student, University of Utah

Director and Lecturer,

*Course in environmental toxicology and medicine,
University of Utah School of Medicine*

*Co – author / author of 5 peer reviewed papers
(in the fields of biochemistry, air pollution toxicology and
infectious disease)*

Richard E. Kanner, MD

Fine Particle Air Pollution

- *Composed of acid aerosols such as sulfates and nitrates, organic chemicals, metals, and carbon soot.*
- *Reduces lung function*
- *Leads to an increase in emergency room visits, hospital admissions, premature death.*

Fine Particle Air Pollution

- *Induces asthma flare-ups and causes wheezing, coughing and respiratory irritation in individuals with sensitive airways.*
- *Especially dangerous for people with chronic obstructive pulmonary disease (chronic bronchitis and emphysema).*

*American Lung Assoc. 2006 Data.
Zonobetti et al. Int J. Epi. 2001.
Ostro et al. Epidemiology. 2001.
Pope et al. NEJM. 2004.*

Fine Particle Air Pollution

*For every 10 mcg / m³ increase
in fine particle pollution:*

- *Overall Mortality increases 4 %*
- *Lung Cancer Mortality increases 8%*

Fine Particle Air Pollution

- *Utah Valley Study:
April 1985 - February 1988*



- *Hospital admissions for asthma and bronchitis in children tripled during episodes of high air pollution*



Ozone Air Pollution

*Reacts with internal body tissues,
damages the cells lining the lungs*

*Exposure to ozone levels at or below
those found in Utah's urban areas:*

- *Premature death*
- *Shortness of breath*
- *Wheezing and coughing*
- *Chest pain when inhaling deeply*

Ozone Air Pollution

Long - term exposure :

- *Reductions in lung function*
- *Inflammation of the lung lining*
- *Increased respiratory discomfort*
- *Increased risk of asthma attacks*

American Lung Association. 2006 Data.

Künzli et al. Env. Res. 1997.

Gent et al. JAMA. 2003.

Who are most at risk from air pollutants ?

- *Children: because they have immature defense mechanisms, inhale more air for their size, and spend more time outdoors.*
- *The elderly: because they have impaired defenses and low reserves.*
- *Patients with heart and / or lung disease.*



Scott N. Hurst, M.D.

- *Past Chair, LDS Hospital Department of Anesthesia.*
 - *Associate Clinical Instructor, University of Utah Affiliated Hospitals.*
 - *Education Liaison, LDS Hospital Department of Anesthesia.*
- *Fellow of the American Board of Anesthesiology.*
 - *Residency: University of Utah, Anesthesiology.*
- *Medical School: University of Utah School of Medicine.*
- *B.A.: Brigham Young University, Magna Cum Laude.*

SHORT TERM EXPOSURE TO PM 2.5 AIR POLLUTION EXACERBATES HEART AND LUNG DISEASE

Air pollution, like smoking, adversely affects blood vessels and circulation.

Even short - term exposures increase the risk of death and of non - fatal events like heart attacks.

A SIGNIFICANT RISE IN
PARTICULATE AIR POLLUTION

(PM 2.5)

produces :

Increased risk of : stroke

Increased risk of : cardiac death

Increased risk of : heart attacks

Increased risk of : high blood pressure

WASATCH FRONT STUDY:

12,000 patients followed for 8 years

Exposure to air pollution with elevated PM - 2.5 raised the heart attack (M.I.) risk.

For every 10 mcg / m³ rise in PM - 2.5, there was a 4.5 % increase in the risk of unstable angina or M.I.

In patients with pre - existing coronary disease, the risk was even more dramatic .

(Pope A et al. Ischemic heart disease triggered by short - term exposure to fine particulate air pollution. Circulation. 2006 (114): 2443 - 2448)

Air Pollution Increases Women's Cardiovascular Risk

*65,000 women studied from 1994 – 1998
(PM - 2.5 varied from 3.4 to 28.3 mcg / m³ in 2000)*

For each rise of 10 mcg / m³ in PM - 2.5 :

- *24% increase in risk of cardiovascular events.*
 - *76% increase in risk of death from cardiovascular disease.*
 - *35% increase in the risk of stroke.*
- *83% increase in the risk of death from stroke.*

(Miller K A et al. Long - term exposure to air pollution and incidence of cardiovascular events in women. NEJM Feb 1, 2007 356 : 5)

AIR POLLUTION RAISES RISK OF FATAL STROKE

Helsinki, Finland. Patients age 65 and older.

- *There was positive association between fatal strokes and 'current – day' and 'previous – day' levels of PM – 2.5, and also with 'previous – day' levels of 'ultrafine' particles.*
- *The association between stroke mortality and exposure to fine particles was mostly independent of other air pollutants.*

(Kettunen J et al. Associations of fine and ultrafine particulate air pollution with stroke mortality in an area of low pollution levels. Stroke. March 2007 (38): 918 – 922)

Scott Hurst, MD

HOW BAD COULD IT BE ?

Exposure to PM - 2.5 raised cholesterol in lab animals.

The animals developed abnormal blood vessels that went into spasm more easily. ($p < .03$).

In a program of high fat diet + polluted air, 42% of arteries examined were clogged. ($p < .001$).

Arterial inflammation characteristically seen; fat content of aorta wall increased 150 %. ($p < .001$).

(Sun Q et al. Long term air pollution exposure and acceleration of atherosclerosis and vascular inflammation in the animal model. JAMA. Dec. 21, 2005, Vol. 294: p 3003 – 10)

Scott Hurst, MD

Shellie J. Ring, MD

MD : Rush Medical College, Chicago

*Residency : University of Utah –
Primary Children's Medical Center*

Fellow : American Academy of Pediatrics

*Past President : 2005 – 06,
American Lung Association of Utah*

*Executive Board Member : the
American Lung Association of Utah*

*Volunteer Medical Director :
Camp Wyatt – an asthma camp for children.*

Children and infants are the most vulnerable to the many air pollutants

- *80 % of lung alveoli develop after birth.*
- *Growth of the lung tissue, and increases in lung function, continue through young adulthood.*
 - *Airways are more narrow in infants and children than in adults.*
- *The central nervous system is rapidly developing.*

*American Academy of Pediatrics, Committee on Environmental Health.
Ambient Air Pollution: Health Hazards to Children. Pediatrics. 2004; 114 (6) : 1699 - 1707*

Shellie J. Ring, MD

Children have increased exposure to air pollutants when compared with adults :

- *Higher minute ventilation / higher metabolic rate.*
 - *Higher levels of activity.*
 - *Spend more time outside.*
 - *Ozone levels often peak when children typically play outside.*
- *Schools, parks and playgrounds are often built on land next to busy roadways.*

*American Academy of Pediatrics, Committee on Environmental Health.
Ambient air pollution: Health hazards to children. Pediatrics. 2004; 114, (6) : 1699 - 1707*

*Bates D V. The effects of air pollution on children. Environmental Health Perspectives.
1995; 103 (supplement 6) : 49-53*

Studies have demonstrated a clear association between air pollution and infant mortality

- *SIDS (sudden infant death syndrome)*
 - *Increased genetic mutations*
 - *Low Birth Weight*
 - *Premature Birth*

#1) Bobak M, Leon D A. The effect of air pollution on infant mortality appears specific for respiratory causes in the post - neonatal period. *Epidemiology*. 1999; 10: 666 - 670.

#2) Prenatal exposure to air pollution associated with genetic abnormalities linked to cancer. *Journal of Cancer Epidemiology Biomarkers and Prevention*. February 2005

#3) Ritz B, Yu F. The effect of ambient carbon monoxide on low birth weight among children born in southern California between 1989 and 1993. *Environmental Health Perspectives*. 1999; 107: 17 -25

#4) Bobak M. Outdoor air pollution, low birth weight, and prematurity. *Environmental Health Perspectives*. 2000; 108: 173 - 176.

#5) Pope C A III, Burnett R T, Thun M J et al. Lung cancer, cardiopulmonary mortality, and long - term exposure to fine particulate air pollution. *JAMA*. 1992; 267 : 1132 - 1141.

Shellie J. Ring, MD

Additional studies support the adverse effects of air pollutants in children

- *Increased respiratory symptoms, SOB, cough, phlegm production.*
- *Increased asthma exacerbations.*
- *Increased use of rescue medication.*
- *Increased hospitalizations and ER visits.*

#1) Pope C A III. Respiratory hospital admissions associated with PM-10 pollution in Utah, Salt Lake, and Cache Valleys. *Archives of Environmental Health*. 1991; 46 : 90 - 97

#2) Gent J F, Tiche E W, Holford T R, et al. Association of low-level ozone and fine particles with respiratory symptoms in children with asthma. *JAMA*. 2003; 290 : 1859 - 1867.

#3) Tolbert P E, Mulholland J A, MacIntosh D L, et al. Air quality and pediatric emergency room visits for asthma in Atlanta, Georgia, USA. *American Journal of Epidemiology*. 2000; 151 : 798 - 810.

#4) Gauderman W J, McConnell R, Gilliland F, et al. Association between air pollution and lung function growth in southern California children. *Am J Respir Crit Care Med*. 2000; 162 : 1383 - 1390.

Shellie J. Ring, MD

Additional studies support the adverse effects of air pollutants in children

- *Increased susceptibility to viral illness.*
- *Reduced annual growth rates of lung function.*
- *Childhood cancers.*

#5) Gauderman WJ, Gilliland GF, Vora H, et al. Association between air pollution and lung function growth in southern California children: results from a second cohort.
Am J Respir Crit Care Med. 2002; 166 : 76 - 84

#6) American Academy of Pediatrics, Committee on Environmental Health.
Ambient air pollution: Health hazards to children.
Pediatrics. 2004; Vol. 114, No. 6: 1699 - 1707

7) Pearson R L, Wachtel H, Ebi K L. Distance - weighted traffic density in proximity to a home is a risk factor for leukemia and other childhood cancers.

8) *J Air Waste Manag. Assoc.* 2000; 50 : 175 -1 80.

Facts

- *Asthma, environmental allergies, childhood leukemia, CNS tumors and childhood learning disabilities – specifically ADHD + autism are on the rise.*
- *Asthma rates increased more than 100% since 1980 in the US.*
- *Motor vehicle traffic in the US has increased three times faster than the population.*

Facts

- *61,000 children in Utah have asthma.*
- *Motor Vehicle Traffic along the Wasatch front is predicted to double within the next 20 years.*
- *Research already supports children are adversely affected at current of ambient air pollution levels.*
- *Salt Lake City ranks 5th among the most polluted US cities.*

Shellie J. Ring, MD

Air Pollution and Children - Summary

- *Good air quality equals good health for infants and children.*
- *Ultimately there is no safe level of air pollution.*

Zell A. McGee, MD, FACP

Board Certification:

*American Board of Internal Medicine (ABIM)
ABIM in Infectious Diseases*

*Fellowship: Infectious Diseases,
Vanderbilt University Medical School,
Walter Reed Army Institute of Research*

*Emeritus Professor of
Internal Medicine and Infectious Diseases*

*Past Chair of Bacteriology and Mycology Study
Section I, National Institute
of Allergy and Infectious Diseases, NIH*

Zell A. McGee, MD, FACP

Dr. McGee will make brief mention of an important, but little known, aspect of air pollution :

Pollutants can significantly suppress immune function, which can significantly increase the risk of serious infections, like meningitis.

Stephens DS, Hoffman LH and McGee ZA Interaction of Neisseria meningitidis with human nasopharyngeal mucosa : attachment and entry into columnar epithelial cells. Journal of Infectious Disease (1983) 148 : 369 – 376.

*Environmental
and
Human Effects of Mercury*

Co - Presenters :

Maunsel B. Pearce, MD

Gerald H. Ross, MD

Maunsel B. Pearce, MD

*2012 Arbor Lane, Salt Lake City, UT 84117
801-272-3616; email: maunsel3616@msn.com*

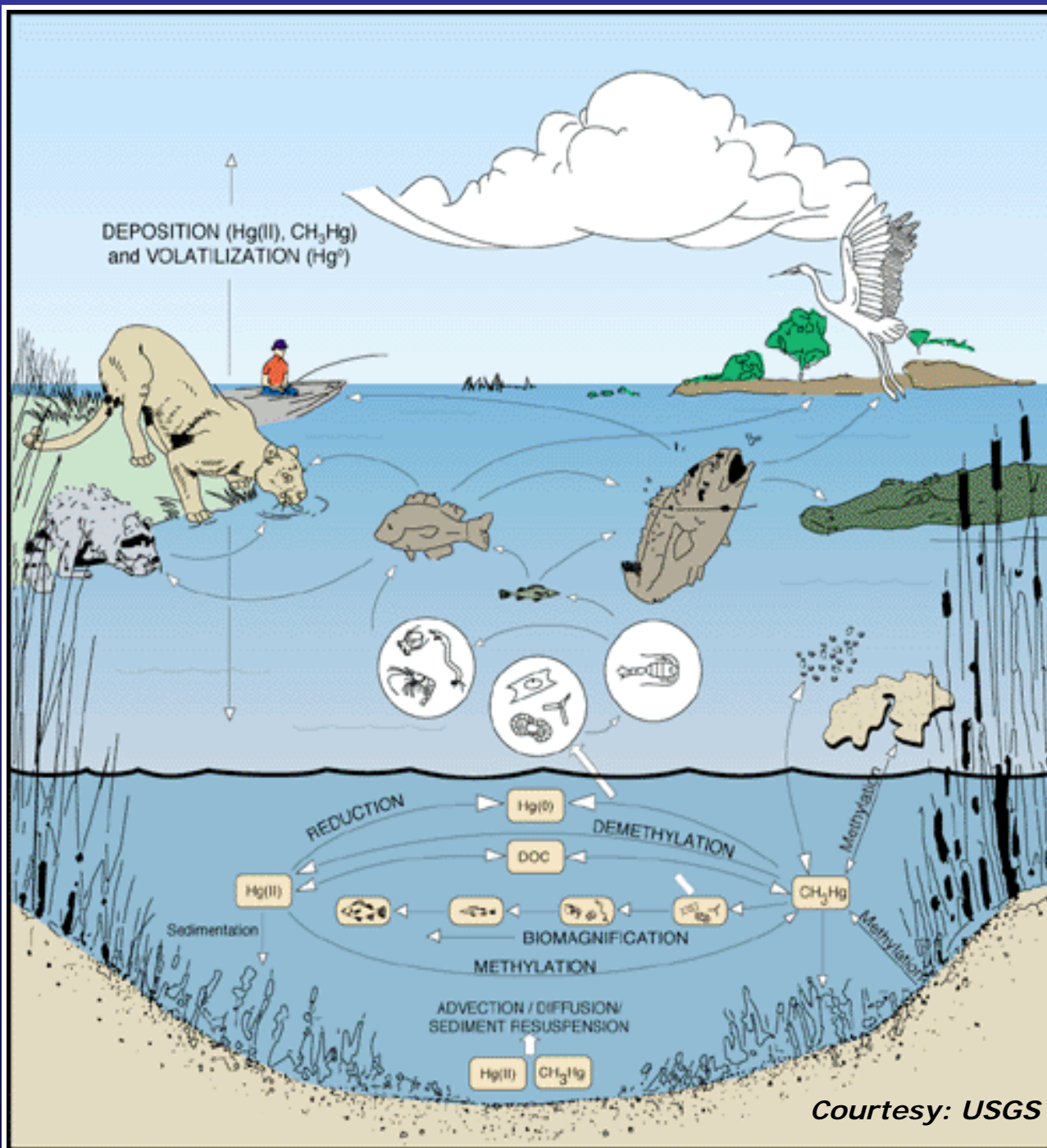
MD, Tulane University, New Orleans, LA

*Residency: Cardiovascular and Thoracic Surgery
– University of Utah*

*Diplomate, American Board of Surgery
Diplomate, American Board of Thoracic Surgery*

*(Retired from private practice of thoracic
and cardiovascular surgery in SLC)*

*Chairman, Great Salt Lake Alliance
Board of Trustees, The Nature Conservancy of Utah
Vice - President, Utah Wetlands Foundation
Member, Great Salt Lake Water Quality Steering Committee*



Courtesy: USGS

Maunsel Pearce, MD

Toxic Effects of Methyl Mercury

- *Readily absorbed by the gastrointestinal tract.*
 - *Blood levels elevated early.*
- *Crosses placenta, blood / brain barrier, secreted in breast milk.*
 - *Potent neurotoxin. Developing neurons are most sensitive.*
- *Renal, reproductive, immune and cardiovascular systems affected.*

1) Agency for Toxic Substances and Disease Registry:
Toxicological Profile for Mercury, 1999.

2) U.S. Public Health Agency

Methyl Mercury and Wildlife

- Long list of fish, amphibians, birds, and mammals with mercury toxicity.

TOXIC EFFECTS :

- *Decreased reproduction*
- *Behavioral abnormalities*
- *Immune system defects*

1) Evers et al. Patterns of freshwater mercury exposure in northeastern North America. *Ecotoxicology* 2005 (14): 193 - 222.

2) National Wildlife Foundation, Sept. 2006
Poisoning Wildlife: The Reality of Mercury Pollution.

Maunsel B. Pearce, MD

Human Toxicity of Methyl Mercury

Two Study Types : A. Retrospective Catastrophic :

1) *Minamata Bay,* 2) *Agano River, Japan;* 3) *Iraq*

B. Prospective Low Dose :

Faroe Islands, Seychelles, New Zealand

Neurologic damage at 6 ppm in 2/3.

*EPA / NRC : 1 in 6 U.S. newborns / yr. have high
'in utero' exposures to methyl mercury.*

1) Japanese Ministry of Environment: www.mind.go.jp

2) Debes et al. Impact of prenatal methyl mercury exposure on neurobehavioral function at age 14 yrs. *Neurotoxicol. Teratol.* 28 (3): 363 – 375

3) Cox et al. Mercury Poisoning in Iraq. *Neurotoxicology* 1995 (16): 727-730

4) US EPA / NRC: Toxic Effects of Methyl Mercury: 2000

5) US EPA / NAS: Mercury Study Report to Congress: EPA – 452 / R-97-009

M. B. Pearce, MD

Methyl Mercury Effects on the Developing Brain (in animals)

- Blocks release of neurotransmitters
- Prevents growth of axons and dendrites
 - Microtubule breakdown
 - Stops division of neurons

*National Research Council,
Toxicological Effects of Methyl Mercury, 2000.
National Academy Press*

Mercury - Toxic Effects in Humans

Exposures at stage of growth :

*In Utero : Mental retardation, cerebral palsy,
deafness, blindness*

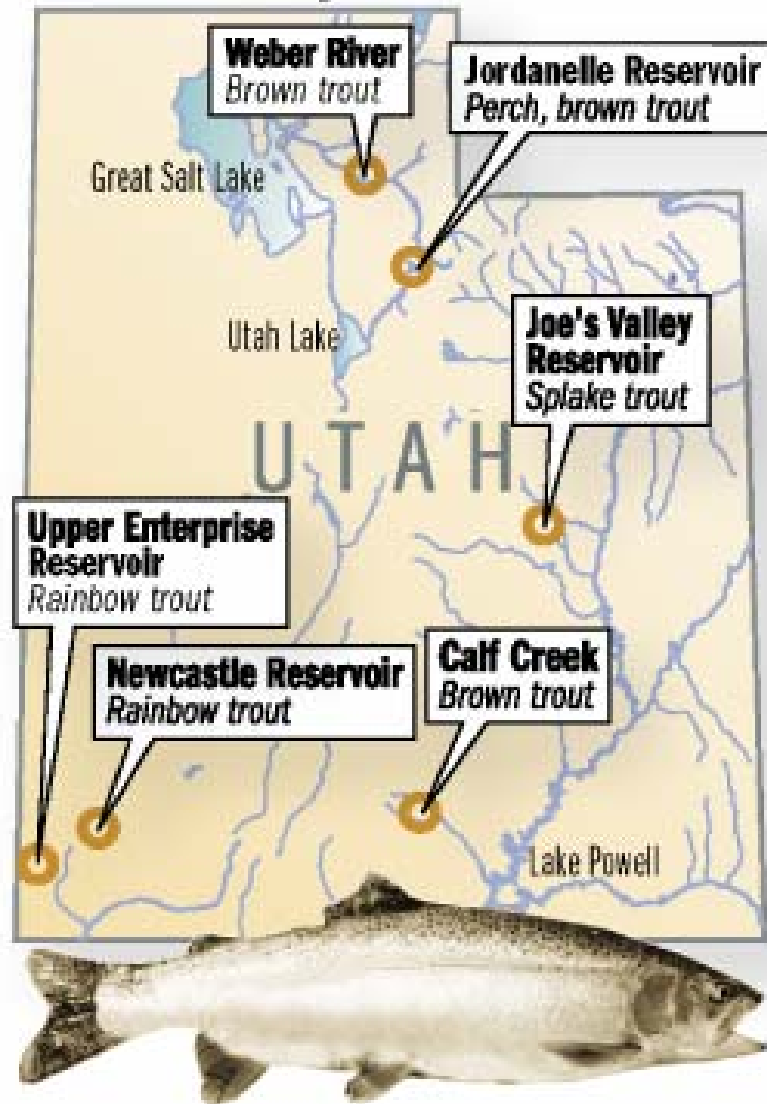
*Children : Decreased IQ, memory and
attention deficits.*

*Adults : Peripheral Neuropathy, motor
impairment, cardiovascular effects.*

U.S. Dept. of Health and Human Services: Toxicological Profile for Mercury: 1997

Maunsel B. Pearce, MD

New mercury advisories



Deseret Morning News graphic

Deseret Morning News

April 24, 2007

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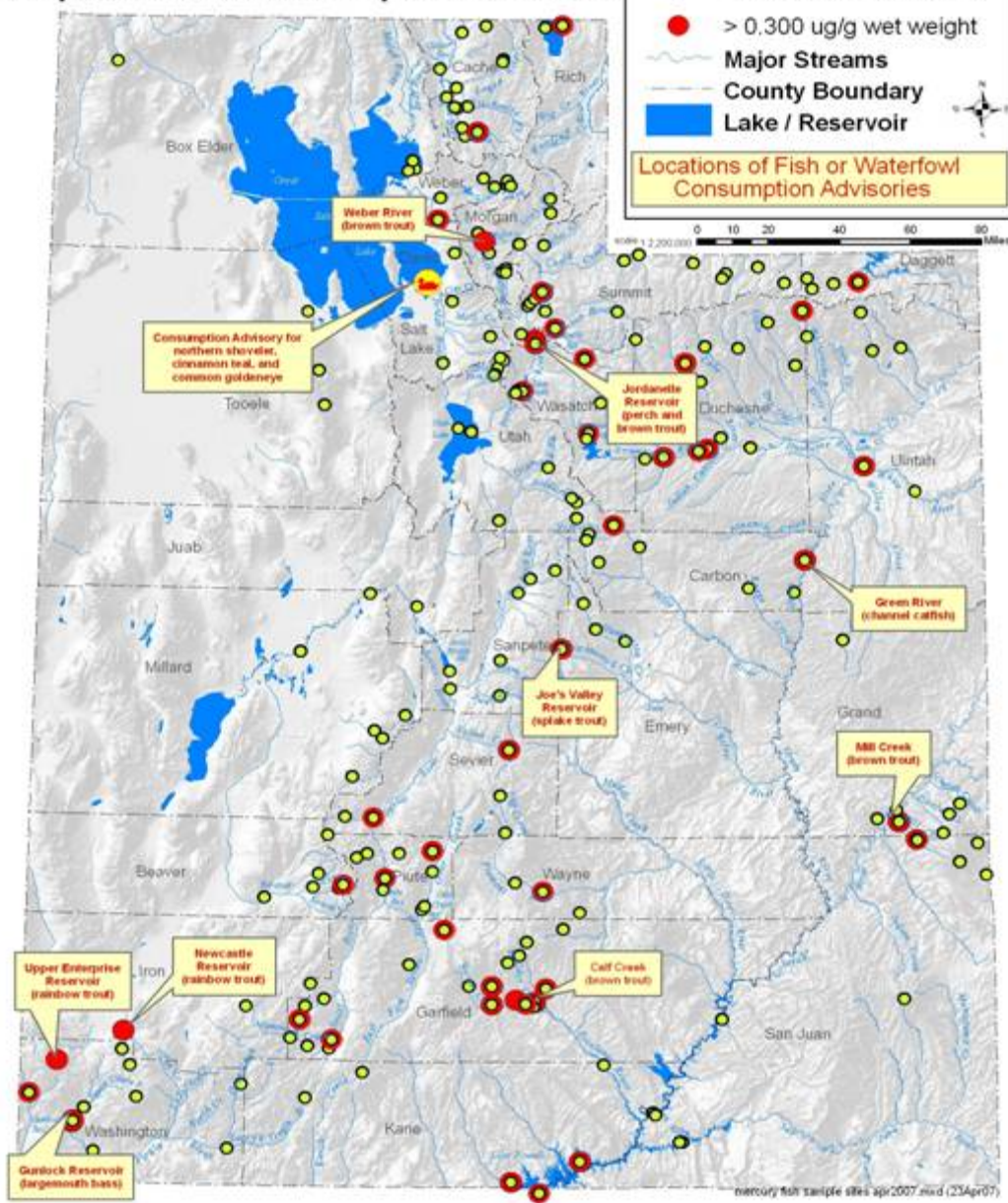
(Article by Joe Bauman)

Trout from 6 more Utah sites are tainted with mercury.

Other state mercury advisories remain in effect for freshwater fish and for waterfowl on the Great Salt Lake.

Maunsel Pearce, MD

Utah Mercury in Fish or Waterfowl Tissue Sample Sites and Consumption Advisories



Source:

*Utah
Department
of
Environmental
Quality*

April 2007

Maunsel B. Pearce, MD

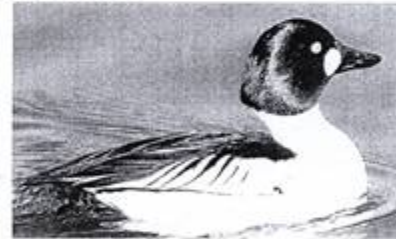
WARNING

**AVOID SHOOTING OR EATING
SHOVELER OR GOLDENEYE
FROM THE GREAT SALT LAKE**

Northern Shoveler



Common Goldeneye



The Utah Department of Health recommends that you not consume meat from these species because of elevated mercury levels.

If you kill either of these species, you must take possession of them and count them as a part of your bag limit.

*Utah
Division of
Wildlife
Resources*

*Mercury
Warning*

Sept 2005

Mercury : Testing and Suggestions for Utah

- *Fish & freshwater mercury testing: not funded 2007.*
 - *Great Salt Lake studies funded in 2007 : \$65,500.*
 - *Mercury air monitoring in Utah is now being planned.*
-

Data for mercury compounds released in 2005 :

Utah : Total: *1121 lbs;* power plants : *500 lbs.*

Nevada : Total: *4850 lbs;* gold mines : *4673 lbs.*

1) *Smith C M and Hutcheson M. Massachusetts Dept. of Environmental Protection, 2006*

2) *Han Y T et al. Change in mercury deposition in New Hampshire associated with changing emission scenarios (computer model) In press.*

3) *U.S. EPA: Toxic Release Inventory: 22 March 2007*

Maunsel Pearce, MD

Mercury : Testing and Suggestions for Utah

*Define extent of environmental contamination,
and the sources of exposure.*

Risk Management has 2 components :

- 1) Limit consumption 2) Reduce local emissions
(effective in other states)*

Accountability to the environment.

1) Smith C M and Hutcheson M. Massachusetts Dept. of Environmental Protection, 2006

*2) Han Y T et al. Change in mercury deposition in New Hampshire associated
with changing emission scenarios (computer model) In press.*

3) U.S. EPA: Toxic Release Inventory: 22 March 2007

*Gerald H. Ross, MD, CCFP,
DABEM, DIBEM, FAAEM, FRSM*

*Board Certifications : Family Med. (Canada);
Environ. Med. (USA).*

*Former President, American Academy of Environmental Medicine.
Board of Governors, American Board of Environmental Medicine.
Fellow, Amer. Academy of Environmental Medicine
Fellow, Royal Society of Medicine, London, UK*

Publications: 28: Co – authored a medical textbook chapter.

Invited speaker to :

*ATSDR, APHA, Amer. Chem. Soc., Health and Welfare Canada,
Assoc. Workers' Comp. Boards (Can), many professional bodies.*



Peggy's Cove Lighthouse -- Nova Scotia

*Strive to emulate the symbolism :
.... be a source of light, guidance, comfort and hope to others.*

Mercury and Autism – A Causation Link ?

Texas study : 2001 EPA data showing county-by-county mercury emissions, mostly coal - fired power plants.

Texas Education Dept. 2001 data was gathered from 1200 school districts, on the rates of autism and the need for special education classes.

These data were compared with environmental mercury release in each geographic area.

The study was controlled for school district population size, race, economic and other demographic factors.

Palmer RF, Miller C et al. Environmental mercury release, Special education rates, and autism disorder: an ecological study in Texas. Health and Place 2006 JUN; 12 (2) : 203-9

Mercury and Autism – A Causation Link ?

" There was a significant increase in the rates of special education students and autism rates associated with increases in environmentally released mercury. "

*" On average, for each 1,000 lb. of environmentally released mercury, there was a 43% increase in the rate of special education services,
- and a 61% increase in the rate of autism. "*

Palmer RF, Miller C et al. Environmental mercury release, special education rates, and autism disorder: an ecological study in Texas. Health and Place 2006 JUN; 12(2): 203-9

Infant cognitive and psychomotor development and low – level prenatal mercury exposure

*Prenatal background environmental exposures to mercury were assessed with cord and maternal blood. (n = 233, 2 yr. study)
(Bayley Scales of Infant Development were done at 1 year of age.)*

Average blood mercury in mothers of normal infants was 0.52 mcg / L, and in mothers with developmentally delayed infants, it was 0.75 mcg / L. (p < 0.01)

Infants with cord blood mercury > 0.80 mcg / L were 3 times more likely to have delayed neurological function, (RR = 3.58) than infants with mercury levels < 0.80 mcg / L.

Jedrychowski W et al. Effects of prenatal exposure to mercury on cognitive and psychomotor function in one – year – old infants: epidemiological cohort study in Poland. Annals of Epidemiology 2006 Jun; 16 (6): 439 – 47 [E – Pub 2005 Nov 7]

Gerald H. Ross, M.D.

Correlations between mercury concentrations in umbilical cord tissue and other biomarkers of fetal exposure to methylmercury in the Japanese population

This study compared total mercury and methylmercury in 1) newborn cord blood, 2) newborn cord tissue and 3) maternal blood, drawn at birth from 116 mothers and their newborns in three Japanese districts.

Total mercury and methylmercury was about twice as high in both cord blood and cord tissue, when compared to maternal blood levels.

Sakamoto W, et al. Environmental Research Jan 2007 Vol. 103, (1): 106 - 111

Gerald H. Ross, M.D.

Correlations between mercury concentrations in umbilical cord tissue and other biomarkers of fetal exposure to methylmercury in the Japanese population

- A) *Over 90 % of the mercury was in the more dangerous methylmercury form.*
- B) *Cord tissue mercury closely matched the cord blood levels.*
- C) *Mercury bio-concentrates within the fetus.*

Sakamoto W, et al. Environmental Research Jan 2007 Vol. 103, (1) : 106 - 111

Gerald H. Ross, M.D.



Minamata Bay, Japan - Permanent neurological effects of mercury poisoning.

Smith, E. W. In: *The Photographer's Bible: An Encyclopedic Reference Manual*.
Arco Publishing Inc., New York, 1983, p. 303

Mercury exposure and human health effects

Speaking of the devastating neurological damage seen with well – known environmental releases of mercury,

William O. Robertson, MD

*(Professor of Pediatrics,
University of Washington School of Medicine
and
Medical Director, Washington Poison Center,
Seattle, Washington), said :*

*“ Prevention or avoidance is far more effective
than any form of treatment. ”*

*Robertson W. O. Chronic Poisoning: Trace Metals and Others.
In: Cecil's Textbook of Medicine, 22nd Ed., Lee Goldman and Dennis Ausiello, (Eds)
Saunders, Philadelphia, 2004 p. 94*

Gerald H. Ross, M.D.



-- *light, guidance, comfort and hope* --

Gerald H. Ross, MD



Brian Moench, M.D.



Scott N. Hurst, MD



Maunsel B. Pearce, MD